Staphylococcus epidermidis is an integral part of the commensal human skin microflora but also acts as an important opportunistic pathogen, particularly in relation to in-dwelling medical device-related infections, such as peritoneal dialysis (PD) catheters. In patients undergoing PD, S. epidermidis is the cause of a significant number of peritonitis episodes, which are potentially life-threatening and can lead to inadequate dialysis and technique failure. The conditioning film formed when implants are placed into the body will affect the potential adhesion of bacteria and thereby subsequent infections. Here we have investigated the effect of different coatings on the adhesion and biofilm growth of S. epidermidis to PD catheter surfaces.

Silicone PD catheters were coated using serum, albumin or a cell-free growth medium supernatant of Pseudomonas aeruginosa and the surface roughness was measured using atomic force microscopy. Proteins of the serum-derived coating were desorbed using different detergents and their natures were studied using 2D gel electrophoresis. S. epidermidis biofilms were allowed to form on PD catheters with the different coatings to study their effect on microbial growth, using confocal laser scanning microscopy and fluorescent staining.

The surface coatings of serum, albumin and P. aeruginosa supernatant were measured to $S_a = 24.77 \pm 5.84$ nm – $37.64 \pm 8.46$ nm, whereas the non-coated PD surface had a roughness of $S_a = 18.92 \pm 3.50$ nm. This indicates the coatings to be too smooth for the surface roughness to affect bacterial adhesion, leaving the surface chemistry as the factor affecting bacterial adhesion. A mixture of 0.006% Tween 80 and 0.012% Triton X-100 was the best detergent solution to remove serum proteins from PD catheters, as indicated using 2D gel electrophoresis, and the proteins most abundant were albumin and albumin precursors. Compared to the non-coated PD catheter, a serum coated catheter harboured 4 times more bacteria (4% surface coverage), whereas albumin and P. aeruginosa supernatant coatings had a similar surface coverage as the uncoated catheter. Interestingly, a PD catheter first coated using serum and then in P. aeruginosa supernatant harboured a similar low bacterial biofilm as the uncoated catheter, indicating the P. aeruginosa supernatant to be able to block the serum proteins binding S. epidermidis bacteria and thereby keeping a low bacterial adhesion.